UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,069	06/30/2006	Christine Robert-Coutant	434299-647	2632

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 October 2009*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5 and 6* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5 and 6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some *   c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

has been timely paid, the finality of the previous Office action has been withdrawn pursuant to

37 CFR 1.114. Applicant's submission filed on 26 October 2009 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

2.   Claims 1, 3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd

(US 4,138,721) in view of Bushberg et al. ("The Essential Physics of Medical Imaging", 2002,

ISBN 0-683-30118-7) and Udupa ("Three-dimensional Visualization and Analysis

Methodologies: A Current Perspective", 1999, Radiographics, Volume 19, Pages 783-806).

        With respect to claim 1, Boyd discloses a method for reconstructing a radiographic image

of a large sized object by bits, the bits being crossed by a diverging radiation produced by a

source, the radiation undergoing an attenuation, the attenuation being measured by a mono-

dimensional or two-dimensional network of detectors on which the radiation projects, each

measurement giving a projection vignette, the source as well as the network of detectors being

displaced along the object at each measurement so that projection vignettes overlap, the method

comprising a combination of the overlapping vignettes for reconstructing the image (Figures 6

and 16), as well as the following steps:

discretising the object into elements defining reconstruction heights (Col. 7, lines 41-44

and Figures 6 and 12);

associating the voxels with at least one detector respective of the network on which the

radiation projects after having crossed the element (Col. 7, line 5 – Col. 8, line 4 and Figures 6

and 12-15);

allocating an attenuation value to each element according to the values measured by the

associated detector (Col. 7, line 5 – Col. 8, line 4 and Figures 6 and 12-15).

Boyd fails to explicitly disclose voxels.

Boyd further fails to disclose combining the attenuation values of the voxels along

parallel columns at the different reconstruction heights to obtain a two dimensional image.

Bushberg et al. teaches voxels (Figure 13-2).

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the method of Boyd to include the voxel representation of Bushberg et al.,

since a person would have been motivated to make such a modification to improve imaging by

providing the 2D CT image which corresponds to a 3D section of the patient with a third

dimension which corresponds to the slice-thickness of the reconstructed image (Page 329, lines

6-14 and Figure 13-2) as implied by Bushberg et al.

Udupa teaches combining the attenuation values of the voxels along parallel columns at

the different reconstruction heights to obtain a two dimensional image (Page 798, Col. 2, line 5 -

Page 799, Col. 1, line 12 and Figure 20. Volume projection, where voxels are directly projected, or ray casting, where line traced perpendicular to the viewing plane. For patient laying on table, such as in Figures 1-4, 6 12, and 16 of Boyd, the projection image generated with either volume projection or ray casting techniques necessarily combines the attenuation values of the voxels along parallel columns at the different reconstruction heights to obtain a two dimensional image, i.e. a projection image.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Boyd as modified above the combining of Udupa, since a person would have been motivated to make such a modification to improve an imaging procedure by allowing the three-dimensional seen be viewed on a two dimensional monitor as is always needed (Page 798, Col. 2, lines 8-11) as taught by Udupa.

With respect to claims 3 and 6, Boyd further discloses the attenuation value attributed to each voxel is obtained by iterative projection of attenuation values measured by the detectors, provisional values being allocated to the voxels and corrected after having been projected on the detectors, in calculating the differences between the sums of provisional values on the projection lines and the values measured by the detectors on the projection lines, and by projecting the differences on the projection lines to correct the provisional values, wherein the attenuation values of the voxels are digitally combined on the groups of voxels superimposed at the different reconstruction heights (Col. 8, line 46 – Col 10, line 38 and Figure 15).

With respect to claim 5, Boyd as modified above necessarily further discloses the method

is applied to osteodensitometry (Boyd further discloses in Figures 1-3, patient imaged to include

bones and Udupa further teaches thresholding (Page 791, Col. 2, lines 16-38, Page 793, Col. 1,

lines 9-19), maximum intensity projections (Page 799, Col. 1, lines 13-20) and voxel projections

of bones (Figure 21).

3.   Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd in view of

Bushberg et al. and Udupa as applied to claim 1 above, and further in view of Ribeiro et al.

("Tridimensional image reconstruction method based on the modified algebraic reconstruction

technique and B-spline interpolation", 1997, IEEE, Proceedings of the Symposium on Computer

Graphics and Image Processing 1997, Pages 111-118).

With respect to claim 2, Boyd as modified above suggests the method as recited above.

Boyd further discloses an attenuation value attributed to each voxel (Col. 9, lines 7-9).

Udupa further teaches the attenuation values of the voxels are combined by a digital

combination on the groups of voxels superimposed at the different reconstruction heights (Page

798, Col. 2, line 5 - Page 799, Col. 1, line 12 and Figure 20, digital image constructed).

Boyd fails to explicitly disclose the attenuation value attributed to each voxel is equal to

the sum of the values measured by the associated detector, divided by the number of vignettes

that contribute to giving the associated detector.

Ribeiro et al. teaches the attenuation value attributed to each voxel is equal to the sum of the values measured by the associated detector, divided by the number of vignettes that contribute to giving the associated detector (Page 114, Col. 1, lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Boyd as modified above the attributing of Ribeiro et al., since a person would have been motivated to make such a modification to improve imaging by reducing reconstruction times by selecting initial estimates for the voxels that more closely approximate expected final iteratively reconstructed voxel values (Page 114, Col. 1, lines 1-42) as implied by Ribeiro et al.

Response to Arguments

4.   Applicant's arguments with respect to at least claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Frieder et al. ("Back-to-Front Display of Voxel-Based Objects", 1985, IEEE, Computer Graphics Applications, Volume 5, Issue 1, Pages 52-60) discloses a method of voxel projection as cited in Udupa above (Reference 72) in which parallel rays are projected through a volume comprising voxels producing orthographic projections (Page 54, entire page, and Figure 3).

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to JOHN M. CORBETT whose telephone number is (571)272-8284.

The examiner can normally be reached on M-F 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. C./
Examiner, Art Unit 2882

/Chih-Cheng Glen Kao/
Primary Examiner, Art Unit 2882